



The Spectrogram

Naked-Eye Comet Possible for Christmas 2001

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A comet detected three months ago is ambling toward the inner solar system and could be visible to the naked eye late this year, possibly providing the best comet show since Hale-Bopp in 1997. Tickets to the show should be popular, as the comet threatens to make its apparition a one-time engagement.

The comet was first thought to be an asteroid when it was spotted Nov. 16, 2000 by researchers at the Lincoln Laboratory Near-Earth Asteroid Research project (LINEAR). It was later identified as a comet and given the official designation of 2000 WM1. Scientists are referring to it as Comet LINEAR, but it is different from the comet 1999 S4, also called Comet LINEAR, which broke apart late in the summer of 2000. "Although no comet can be relied upon completely, there is a very good chance that [this comet] will be a naked-eye Christmas comet for 2001," says astronomer Mark Kidger. The show is expected to continue into early 2002.

How bright will it be? Comets are made mostly of dust and gas, primarily carbon dioxide, ammonia and methane. Scientists liken them to dirty snowballs. Predicting how bright they will get as they approach the inner solar system has proven tricky in the past. Like all comets, 2000 WM1 will loop around the Sun, though its path is not yet known with certainty. As it approaches the Sun, gas and dust will burn off at an increasing rate. Sunlight reflecting from this material will make the comet's head, or coma, grow brighter. The gas and dust will be pushed away by charged particles known as the solar wind, forming two tails. Dust particles form a yellowish tail, and ionized gas makes a bluish ion tail. The tails always point away from the Sun.

How bright a comet gets depends on many factors, including its size, exactly what it's made of and how close it gets to the Sun and Earth.

Estimates by Brian Marsden at the International Astronomical Union's Minor Planet Center put the peak brightness for Comet LINEAR at roughly magnitude 4. On this scale, higher numbers are fainter. The faintest object visible to the naked eye under dark rural skies is about magnitude 6, for example. The brightest stars are around magnitude *minus* 1.4. Venus, at its most brilliant, reaches *minus* 4.4.

Kidger figures the peak brightness will be between magnitude 3 and 5, sometime in November, and he's optimistic that it will be on the brighter side. Better estimates will be possible in April or May, he says.

"In all cases apart from the most pessimistic, the comet should be naked-eye visible," Kidger says. "The worst case would make it an easy binocular object."

Fact of the Month

The surface temperature of a neutron star, a star that is composed almost entirely of neutrons, is about 1.8 million degrees Fahrenheit.

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Important Announcements



- ? **The next S*T*A*R meeting** will be held on Thursday, March 1, 2001 at 8 PM at the Colts Neck Fire House #2 on Conover Rd. in Colts Neck. STAR President, Gordon Waite, will be reviewing his Astrophotography Pilgrimage to the dark skies of the Southwest, U.S. **Directions:** From Rt. 520, turn south onto Rt. 34. Conover Rd. is on the right, one light south of Rt. 520. From Rt. 537, turn north onto Rt. 34. Conover Rd. is on the left, two lights north of Rt. 537. The fire house is on the right, just a couple of blocks off of Rt. 34.
- ? **STAR Store!** Yup! Own a piece of STAR! You can now order merchandise online. Visit <http://www.cafepress.com/star> or get stuff with the NEW and IMPROVED STAR Logo at www.cafepress.com/star2. (Note the 2 at the end) Please contact me with questions.
- ? **Have you paid your dues?** If not, please contact John Gasparini at the March meeting to square up.
- ? **The year 2001** (the first year of the new millennium) will offer a good opportunity for **hunting down all 110 Messier objects, as New Moon occurs on March 25 (weekend March 24-25, 2001)**. This year, there will be a considerably good chance to combine the Messier marathon with an **all-planet marathon**, i.e. you can observe all solar-system planets during this night. **Some comets** brighter than about mag 14.0 will also be visible.

Letter from the (sometimes MIA) Editor...



Well, I am sure that some of you are upset that you didn't get your January and February newsletters. Yup. I blew it. December was not a good month for computers on this side of the pond. I had to replace just about every piece of my home pc and I lost quite a bit of data. I did not have time to get the PC repaired and still do the newsletter. Yeah, excuses excuses.... What can I say?

For the February newsletter I just couldn't find the time. I know it's a poor excuse but it's the only one I have. New duties at work and of course the never ending adjustment to fatherhood have taken a toll on me. I haven't even been out to use my 20" Obsession since before Thanksgiving. Sad eh? Well, don't let your tears for me ruin this newsletter!! :)

I had to duplicate from scratch the whole newsletter layout as I lost the master copy that took me 2 days to design in the first place. Here it is again after 6 hours of work trying to get it to look the same as it did before. I hope it looks ok.

I want to apologize to the membership BUT MOST IMPORTANTLY the ones that were helping me with content for the newsletter when I did in fact get it out in time! You know who you are people. Thanks so much. I hope that you consider continuing your submissions for inclusion in future newsletters.

There ya have it. Again, I'm sorry.

Fred



Naked-Eye Comet Possible for Christmas 2001 (cont.)

NASA's Ron Baalke echoed Kidger's caution, saying that predicting the brightness of a comet is far from an exact science. "The current estimates on how bright the comet may be varies from magnitude 3 to magnitude 7," Baalke said. "There is a possibility the comet may be a naked-eye comet, but there is no guarantee that it will be." **A big show, then gone forever?** As of Feb. 21, Comet LINEAR was 447 million miles (719 million kilometers) from the Sun, about as far out as Jupiter, and poking along at 42,500 miles per hour (19 kilometers per second). The Sun's gravity has pulled the comet in from the distant Oort Cloud, a reservoir of icy bodies that surrounds the solar system and was created back when the Sun formed, some 4.5 billion years ago.

As the dirty snowball gets closer to the Sun, it will speed up enormously, Kidger explains, reaching a top speed of 125,300 miles per hour (56 kilometers per second) on Jan. 22, 2002. On that day, it will be at its closest point to the Sun, some 51.7 million miles (83.2 million kilometers) away. Scientists call this perihelion.

Astronomers suspect that 2000 WM1 is a "new" comet, making its first pass from the Oort Cloud into the inner solar system. Marsden of the minor planet center calculates that it won't come around again for at least 100,000 years. However, the orbit appears to be "open," meaning that 2000 WM1 may shoot off into interstellar space and never return.

Kidger says the comet's diameter is roughly 2 miles (3 kilometers), though this estimate may change as better observations are made. On approach to the Sun, the comet will pass within 30 million miles (49 million kilometers) of Earth in early December.

This scenario will be similar to Comet Hyakutake in 1996, which was estimated to be about the same size and came within 9.3 million miles (15 million kilometers) of our planet. Comet Hale-Bopp in 1997 was much larger, some 25 to 44 miles (40 to 70 kilometers) wide. But Hale-Bopp was almost 15 times farther away than Hyakutake. Both comets made for delightful naked-eye viewing and fabulous telescopic photographs.

Like Hyakutake, Comet LINEAR may reach its peak brightness before perihelion. Kidger says this means that while it should be easy to see, the comet's tail may not be very spectacular.

"The fact that the comet is new suggests that it will probably brighten quickly initially and then slow down considerably as it gets closer to the Sun and the fresh ices on the surface of the nucleus are exhausted," Kidger says. "A consequence of this is that it is unlikely that the comet will have a bright tail when [it is] closest to the Earth and brightest at the end of the year. Even though Comet LINEAR may be quite bright and easy to see with the naked eye, it may be little more than a fuzzy patch in the sky."

Planet Roundup for March...



MERCURY is barely above the east-southeast horizon as dawn grows bright. Try looking for it with binoculars about 40 minutes before sunrise.

VENUS is the brilliant object (magnitude -4.6) shining in the west during and after dusk. It's getting lower each week.

MARS (magnitude +0.5, in the head of Scorpius) rises around 1 a.m. and glows yellow-orange in the south before dawn. To its lower left is similarly-colored Antares, somewhat fainter.

JUPITER and SATURN (magnitudes -2.3 and -0.2, respectively) shine brightly in the evening high in the southwest to west. Jupiter is the brightest; yellowish Saturn is 8 degrees to Jupiter's lower right. To Jupiter's right are the Pleiades, and farther to Jupiter's left or upper left sparkles orange Aldebaran.

URANUS and NEPTUNE are hidden in the glare of the Sun.

PLUTO (magnitude 14; invisible without a large telescope) is in Ophiuchus in the south before dawn.



What is a Messier Marathon? - By Bill Ferris

It is not easy. Observing 110 star clusters, nebulae and galaxies over the course of a single night requires planning, stamina and perhaps a narrow masochistic streak. The Messier Marathon is an all-night endurance race. The race is not against other observers but against the Sun. The distance to cover is 360 degrees of sky with more than 100 checkpoints along the way. It is a race that has been run by thousands of amateur astronomers over the last 20 years. But only a few have completed the circuit. How did amateur astronomers ever get involved in such a thing?

Charles Messier was the greatest comet hunter of his time. Born in 1730, the tenth of twelve children, Messier was deeply influenced by the appearance of Donati's comet in 1744. He left home at the age of 21 to pursue his dreams. Messier landed in Paris and was hired by Nicholas Delisle, France's Astronomer of the Navy. At first, Messier's duties were limited to making copies of important documents and maps. Eventually, he became a skilled observer and was assigned the task of looking for a comet predicted to return to the skies above Europe in 1758. The prediction had been made decades earlier by English astronomer, Edmund Halley.

Messier succeeded in finding Halley's comet on the night of January 21, 1759. He discovered the comet in Pisces, observing from the Hotel de Cluny. Unfortunately, Messier had not been the first to see Halley's comet. Johann Palitzch, a German farmer, had spotted the comet from his fields on Christmas night, 1758. Charles Messier had missed making the greatest comet discovery in history by just a few weeks. But his career as an astronomer and comet hunter was just starting.

Messier discovered his first comet one year later in January 1760. Of the 14 comets discovered between 1760 and 1773, eight were found by Messier. Charles Messier would be credited with the discovery or co-discovery of 13 comets over the course of his career. He advanced to be heralded as the greatest comet hunter of his generation.

Messier occasionally ran across objects that looked like comets but weren't. He published two catalogs describing and giving position for 103 objects. These 103 star clusters, nebulae and galaxies comprise the bulk of the modern Messier catalog. Seven additional entries have been added over the years, bringing the total to 110.

Conveniently, there is a gap in the catalog between 21:40 and 00:40 right ascension. Only M52, a circumpolar object for observers at midnorthern latitudes, falls within the gap. As a result, all 110 objects in the Messier catalog can be observed from sunset to sunrise during late March. This is the Messier Marathon. I observed 109 Messier objects the night of March 13-14, 1999, at the All-Arizona Messier Marathon. The observations were made from 7:40pm to 5:40am including a two-hour break for a nap. Adjusting for the nap, that's an average of one object every five minutes. I mention this to illustrate the fact that a well-ordered observing list is essential to a successful Messier Marathon. A Messier Marathon is a sprint from object to object. Time is limited.

You won't have a lot of time to enjoy the objects. This kind of observing is often not very fun. The Messier Marathon is not for everybody and you're not required to participate. But it does offer benefits to the participants. Marathoning challenges you as an observer. It develops your star hopping technique. When you're done, you will have observed most--if not all--of the Messier catalog. Some amateur astronomers never get that far.

A good observing list will allow you to observe all night or part of the night. If you want to break for a snack, to chat with a friend or simply to gaze up at the stars with the unaided eye, you can easily rejoin the hunt at any place on the list. It can be used any clear night of the year. I keep this list handy with my other charts. There's nothing better than observing a few Messier objects to recharge the batteries after hunting down 13th magnitude galaxies all night.

My list is a combination of one published in Don Machholz's Messier Marathon Observer's Guide and another published in the March 1994 issue of *Astronomy* magazine. It should be suitable for any observer located between 30 degrees and 40 degrees north latitude. The list is divided into seven sections or stages according to the time of night each group of objects is best observed. My list also includes a scheduled 2:30 nap break.

You can find Bill's list and schedule for the Marathon at:

<http://hometown.aol.com/billferris/marathon2.html>

You can also email Bill at BillFerris@aol.com.



First Black Hole in Milky Way's Halo Found

Scientists have discovered what appears to be the first known black hole sitting high above the Milky Way Galaxy, nestled in what's called the galactic halo, a vast sphere of sparsely populated space that is still affiliated with the galaxy. While black holes are only theoretical, researchers detect them based on the movement of companion objects, or by noting energetic X-ray emissions from the region surrounding the objects.

"We are intrigued to find such an object in the galactic halo," said R. Mark Wagner of the University of Arizona, who worked with one of two teams that independently and unwittingly made the discovery using the same telescope. "Because this is so far above the galactic plane, there is almost no interstellar medium between us and the object, so we can study it in detail like no other object in its class." The newly found black hole is estimated to be six to eight times as massive as our Sun, larger than some but smaller than many. It lies approximately 6,000 light-years away, 62 degrees above the galactic plane. It was spotted because of the motion it imparts on a nearby normal star, one smaller than our Sun, which orbits it every 4.1 hours. The black hole sucks matter from the small star, and will eventually swallow it. "We expect that in about 2 billion or 3 billion years, the normal star will reach the black hole and be consumed," said Jeffrey McClintock of the Harvard-Smithsonian Center for Astrophysics, who worked with the other team. The matter falling into the black hole, while it can't be seen, is heated to millions of degrees by friction and gravity, and the heat energy produces strong X-ray emissions, McClintock said in a statement released last week. But the system is now fairly quiet, which allowed researchers to note the orbiting small star.

Only recently, scientists have begun to understand the mechanisms that seem to turn black holes on and off. But they have yet to actually see a black hole, and there has been only one case, not yet confirmed, of seeing matter just as it disappears into a black hole. The objects are so massive that they suck all nearby matter inward. Nothing gets out of a black hole -- not even light. That makes them hard to study.

But because scientists have a relatively unobstructed view of this newest object, they expect it to prove fruitful in future studies.

Astronomers have previously identified 10 similar objects in the galactic plane, and an additional 20 X-ray sources in the Milky Way are suspected of being black holes. All of these are far smaller than the colossal black hole thought to inhabit the core of the galaxy. It has a mass equivalent to 2.6 million Suns.

The newly spotted object was first noticed as an X-ray source by a space-based telescope in 2000. The new observations were made using a new 6.5-meter (255-inch) telescope at the MMT Observatory on Mount Hopkins in Arizona. The results from both studies are scheduled to appear in an upcoming issue of *Astrophysical Journal Letters*.

Rob Teeter in the News! - By Rob Teeter



In the 2/22/01 Howell-Jackson Reporter (and possibly other regional editions of the Reporter, which is the Thursday insert in the Asbury Park Press) there was an article featuring myself and a few mentions of STAR Astronomy. I was interviewed last week by the Asbury Park Press and a photographer was sent out to take a few pictures of me and the telescopes to go along with the article. This is the third publication I have been featured in (the other two being The Farmingdale Fanfare and The Tri-Town News) and I have made sure I mentioned STAR whenever interviewed. I don't know where I would be without STAR Astronomy (probably out on the streets at night getting in trouble like all other teenagers) and I feel it is my duty to put in a good word.

For those of you interested, take a look in yesterdays paper and read the article, it really does justice for myself and for the hobby of Astronomy in general.

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Here it is! This month's issue of...

THE SPECTROGRAM

THE 10th ANNUAL NORTHEAST ASTRONOMY FORUM & TELESCOPE SHOW

May 5 - May 6, 2001

In the 10 years since its inception, the Northeast Astronomy Forum & Telescope Show has grown from a small local event to a nationally recognized trade show. Last year the show was moved to a new, larger venue at the Rockland Community College. This year it will grow again as the show is expanded to 2 days.

This year they are also continuing the tradition of bringing together the very best vendors in amateur astronomy (more than 70 of them), as well as a group of distinguished speakers from the field. They are making every attempt to make this the best NEAF yet, and hope you will enjoy the show.

Plan on going? Post a message to the STAR Discussion Board to let other members know. Carpooling is the way to go and getting there early is the KEY to great deals! This editor is sure to be going.

More info on the web: <http://www.rocklandastronomy.com/neaf.htm>